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TILLAGE, PLANTING, AND HARVESTING EQUIPMENT ON GRAIN FARMS AND RATES OF DOING FIELD WORK WITH THESE IMPLEMENTS WHEN DRAWN WITH HORSE AND WITH TRACTOR POWER

(Northern Great Plains and Pacific Northwest)

By R. S. Washburn, Assistant Agricultural Economist,

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TILLAGE, PLANTING, AND HARVESTING EQUIPMENT ON GRAIN FARMS AND RATES OF DOING FIELD WORK WITH THESE IMPLEMENTS WHEN DRAWN WITH HORSE AND WITH TRACTOR POWER (NORTHERN GREAT PLAINS AND PACIFIC NORTHWEST)

By R. S. Washburn, Assistant Agricultural Economist, and Della Merrick, Senior Clerk, Bureau of Agricultural Economics

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INTRODUCTION

Successive years of low farm incomes have seriously reduced the resources of many farmers in the spring wheat regions of the Northern Great Plains and in the Pacific Northwest. Because of the need for adjustments in the organization and operation of grain farms in these regions and in the light of changing economic conditions information with reference to farm organization and farm practice was obtained.

The study was made in April, May, and June of 1934 and for the most part applies to the crop year 1933. The field data were obtained by personal interviews with 1,674 farm operators in grain-producing areas of the Northern Great Plains and the Pacific Northwest. The farming areas surveyed as shown in figure 1, are those outlined in United States Department of Commerce, Bureau of the Census Bulletin "Types of Farming in the United States, 1930". The farmers interviewed gave detailed information on the organization and operation of their farms, such as acreage of wheat and other crops grown; a history of crop yields over a period of years; the practices employed in the production of wheat and other crops; the numbers and kinds of livestock; the kinds and quantities of livestock products; an inventory of the kinds and quantity of equipment on the farm; the duty of farm machinery and the cost of operating power equipment.

As the study aimed to show the methods of growing and harvesting crops particularly wheat, the sample of farms may show a larger acreage of wheat and a higher proportion of the land in crops than would a county average. No particular effort was made for any other selection, however, and it is believed that the records obtained are typical of grain farms in the type-of-farming areas studied.

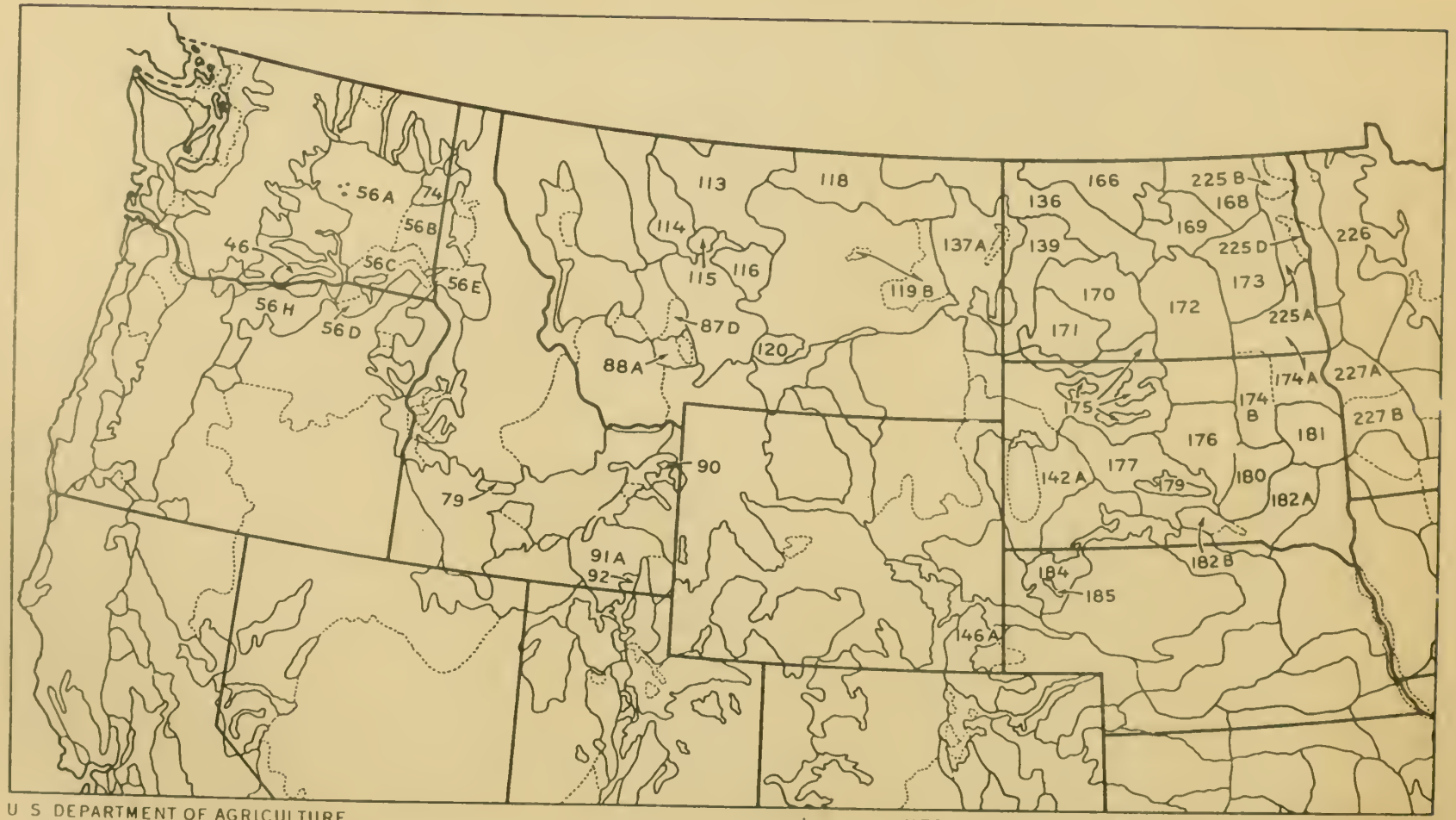

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FIGURE 1.- TYPE-OF-FARMING AREAS WHERE STUDY WAS MADE OF TILLAGE, PLANTING AND HARVESTING EQUIPMENT ON GRAIN FARMS. (AREAS ARE THOSE OUTLINED IN UNITED STATES DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS BULLETIN "TYPES OF FARMING IN THE UNITED STATES, 1930").

In certain sections of the Northern Great Plains, particularly western North Dakota, eastern Montana, and in many areas of South Dakota, conditions of extreme drought prevailed in 1933. Because of the small harvest reported in these drought areas the harvest work done with power equipment was abnormal. The use of equipment in a normal season rather than that reported in 1933 has been used.

In many areas the use of large scale power equipment was common and constituted a large part of the farm expense. For this reason a series of reports dealing with farm equipment is being published.

The purpose of the present report is to make available to research workers and others, information relative to kind, size, and accomplishment of field implements on representative grain farms. The first part of the report gives numbers and sizes of field implements by type-of-farming areas. The second part of the report shows the rates at which these implements did field work when drawn with horses and with tractors. The other publications in the machinery series are:

1. Utilization of tractors and cost of tractor power on grain farms (Northern Great Plains and Pacific Northwest, 1933).

2. Utilization of combined harvester-threshers and cost of harvesting small grains with a combine (Northern Great Plains and Pacific Northwest, 1933).

3. Cost of operating farm motor trucks on grain farms (Northern Great Plains and Pacific Northwest, 1933).

TOPOGRAPHY, SOIL, AND TYPE OF FARMING

Physical conditions in the type-of-farming areas in the Northern Great Plains, where the study was made, are favorable to the use of medium to large equipment drawn with tractors. The prevailing topography in the farming areas is level to slightly rolling. The soil types range from sands to clays. Although the proportion of the crop area utilized for the production of different crops varies to a considerable extent in, as well as between, the several type-of-farming areas, the agriculture of the region may be classified as a cash grain type of farming with wheat the major crop (table 1).

A classification of the crop areas of the region indicates that proportionately more of the crop acreage was devoted to small grains and summer fallow in central and western Montana and in southeastern Wyoming than in the other type-of-farming areas studied. In southeastern Wyoming about 15 percent of the crop area was devoted to corn. Here, as well as in Montana, few crops other than small grains were grown. From west to east a rather decided change in cropping practice began to appear. Instead of wheat being alternated with summer fallow, the common practice was to grow wheat in combination with corn, oats, and barley, particularly in western Minnesota and eastern North and South Dakota, the greatest concentration of corn acreage being in southwestern Minnesota and in central and eastern South Dakota. A considerable potato acreage was grown on some farms in northwestern Nebraska and in western Minnesota. Other crops

Table 1. - Crop area per farm by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Farm area per farm	Crop area per farm					
			Row crops	Small grain crops	Other crops	Summer fallow	Idle	Total
	Number	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Minnesota								
225A	43	364	30	212	38	22	3	305
226	16	297	11	91	53	4	1	160
225D	20	396	23	225	56	27	-	331
227A	25	294	82	142	21	-	-	245
227B	29	243	71	114	12	3	1	201
North Dakota								
225B	12	592	18	270	87	68	1	445
173	34	550	26	289	27	37	7	386
174	52	559	65	267	29	14	-	375
168	40	639	3	379	45	83	1	511
169	36	659	6	434	14	39	7	500
172	55	649	37	285	9	7	8	346
170	37	594	33	228	18	1	2	282
171	48	800	36	382	8	1	6	433
136	70	680	13	350	9	31	21	424
139	19	736	13	360	10	57	18	458
166	40	621	25	320	27	61	66	499
South Dakota								
181	32	400	54	214	33	4	6	311
182A	27	294	83	115	10	-	-	208
174B	31	564	88	277	12	1	4	382
180	30	454	111	154	10	2	2	279
176	41	1,224	123	414	23	14	7	581
179	19	1,733	70	409	27	-	4	510
182B	26	478	75	263	20	-	-	358
175	29	930	53	375	36	[illegible]	16	484
142A and 177	27	856	105	283	45	1	12	446
Nebraska								
184	47	656	106	201	26	9	10	352
185	22	768	187	401	29	39	9	665
Montana								
137A	34	618	46	231	21	24	20	341
119B	23	1,037	13	496	21	65	11	606
118	29	842	10	247	8	48	57	370
113	60	1,311	4	455	2	187	72	720
114	46	714	-	325	11	202	5	543
115	26	1,274	2	602	28	454	8	1,094
116	41	616	3	330	17	118	10	478
87D	22	716	-	144	35	118	18	315
88A	42	552	-	182	24	178	-	384
120	20	1,936	10	301	29	148	8	496
Wyoming								
146A	30	1,014	105	356	12	204	3	680
Total	1,270	717	45	293	23	61	12	436

Table 1. - Crop area per farm by type-of-farming areas, Northern Great Plains, 1933 - Continued

State and type-of-farming area	Farms	Farm area per farm	Proportion of crop area					
			Row crops	Small grain crops	Other crops	Summer fallow	Idle	Total
	Number	Acres	Percent	Percent	Percent	Percent	Percent	Percent
Minnesota								
225A	43	364	9.8	69.5	12.5	7.2	1.0	100.0
226	16	297	6.9	56.9	33.1	2.5	.6	100.0
225D	20	396	6.9	68.0	16.9	8.2	-	100.0
227A	25	294	33.5	58.0	8.5	-	-	100.0
227B	29	243	35.3	56.7	6.0	1.5	.5	100.0
North Dakota								
225B	12	592	4.1	60.8	19.6	15.3	.2	100.0
173	34	550	6.7	74.9	7.0	9.6	1.8	100.0
174A	52	559	17.4	71.2	7.7	3.7	-	100.0
168	40	639	.6	74.2	8.8	16.2	.2	100.0
169	36	659	1.2	86.8	2.8	7.8	1.4	100.0
172	55	649	10.7	82.4	2.6	2.0	2.3	100.0
170	37	594	11.7	80.8	6.4	.4	.7	100.0
171	48	800	8.3	88.2	1.9	.2	1.4	100.0
136	70	680	3.1	82.5	2.1	7.3	5.0	100.0
139	19	736	2.8	78.6	2.2	12.5	3.9	100.0
166	40	621	5.0	64.2	5.4	12.2	13.2	100.0
South Dakota								
181	32	400	17.4	68.8	10.6	1.3	1.9	100.0
182A	27	294	39.9	55.3	4.8	-	-	100.0
174B	31	564	23.0	72.5	3.1	.3	1.1	100.0
180	30	454	39.8	55.2	3.6	.7	.7	100.0
176	41	1,224	21.2	71.2	4.0	2.4	1.2	100.0
179	19	1,736	13.7	80.2	5.3	-	.8	100.0
182B	26	478	21.0	73.4	5.6	-	-	100.0
175	29	930	11.0	77.5	7.4	.8	3.3	100.0
142A and 177	27	856	23.5	63.5	10.1	.2	2.7	100.0
Nebraska								
184	47	656	30.1	57.1	7.4	2.6	2.8	100.0
185	22	768	28.1	60.3	4.1	5.9	1.6	100.0
Montana								
137A	34	618	13.5	67.6	6.1	7.0	5.8	100.0
119B	23	1,037	2.2	81.8	3.5	10.7	1.8	100.0
118	29	842	3.7	66.7	2.2	13.0	15.4	100.0
113	50	1,311	.5	63.2	.3	26.0	10.0	100.0
114	46	714	-	59.9	2.0	37.2	.9	100.0
115	26	1,274	.2	55.0	2.8	41.5	.7	100.0
116	41	616	.6	69.0	3.6	24.7	2.1	100.0
87D	22	716	-	45.7	11.1	37.5	5.7	100.0
88A	42	552	-	47.4	6.2	46.4	-	100.0
120	20	1,936	2.0	60.7	5.9	29.8	1.6	100.0
Wyoming								
146A	30	1,014	15.4	52.4	1.8	30.0	.4	100.0
Total	1,270	717	10.3	67.7	5.3	14.0	2.7	100.0

grown to a limited extent in most areas were rye, spelt, alfalfa, and sweet-clover.

Conditions in the Pacific Northwest are quite different in many respects than those in the Northern Great Plains. The soil type is mainly a silt loam whereas the prevailing topography is rolling to hilly. Wheat was the principal crop grown. It was alternated with summer fallow, wheat together with summer fallow comprising most of the crop acreage (table 2). Few other crops were grown to any extent except in type-of-farming area 56B in eastern Washington, where peas were of considerable importance, and in type-of-farming area 92A in southern Idaho, where the acreage of alfalfa was quite extensive.

KINDS AND SIZES OF FIELD EQUIPMENT

The kinds of field implements on farms in the areas surveyed are, of course, quite closely associated with the kinds of crops grown. In order that the reader may have a clear picture of the kinds and sizes of field implements on these farms, the implements have been classified in detail by type-of-farming areas.

Farmers in these areas have a decided tendency to keep abreast of the changes and improvements that have been made in farm equipment as the changes that have occurred in the implements employed in the harvesting of grain demonstrates. Formerly all of the grain in the Northern Great Plains was harvested with a binder or header and threshed in a stationary thresher. Although this method of harvest still prevails in many sections of the Northern Great Plains, there are areas, notably in Montana, where harvesting grain with the combined harvester-thresher has, for the most part, superseded other harvesting methods. Because of these changes some of the implements shown in the tables on farm equipment inventories which follow are not in general use.

In the Northern Great Plains, plows of the moldboard type were represented by the greatest numbers. They were common in all areas and for the entire region those with 2-bottoms were the most usual (table 3). This was particularly true in Minnesota and in eastern North and South Dakota where farms for the most part are of moderate size and where a more or less general type of farming prevails. In the more westerly areas where farms are larger, 3-bottom and 4-bottom moldboard plows were reported more frequently than smaller sizes. Disk plows were confined almost exclusively to the north central areas of Montana (table 4), and here, although they were included in the farm inventory, they were being rapidly displaced by vertical disk plows. 1/ Vertical disk plows were reported in substantial numbers only in the north central areas of Montana and in southeastern Wyoming (table 5). Those of from 8- to 10-foot widths were the predominate sizes.

In the Pacific Northwest moldboard plows were common to all areas. Two- and three-bottom plows were the ones in most common use (table 6). Vertical disk plows were not common except in area 56A in Washington, where they were found on about 62 percent of the farms studied (table 7).

1/ Sometimes referred to as wheatland disk plows.

Table 2. - Crop area per farm by type-of-farming area, Pacific Northwest, 1933

State and type-of-farming area	Farms	Farm area per farm	Crop area per farm					
			Row crops	Small grain crops	Other crops	Summer fallow	Idle	Total
	Number	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Oregon								
56H	41	1,676	-	591	12	629	4	1,236
56D	30	1,412	-	598	31	568	-	1,197
Washington								
46	32	1,823	-	597	15	519	36	1,167
56C	41	1,465	-	657	11	663	1	1,332
56A	63	1,259	-	541	1	524	8	1,074
56B	58	488	3	222	65	133	-	423
74	24	472	6	190	10	132	4	342
Idaho								
56E	33	665	1	271	9	225	-	506
79	15	1,116	-	377	39	314	49	779
90	23	942	-	383	6	315	46	750
91A	29	642	-	220	17	187	16	440
92A	15	740	-	170	46	164	5	385
Total	404	1,085	1	426	21	390	11	849

Table 2. - Crop area per farm by type-of-farming area, Pacific Northwest, 1933
Continued

State and type-of-farming area	Farms	Farm area per farm	Proportion of crop area					
			Row crops	Small grain crops	Other crops	Summer fallow	Idle	Total
	Number	Acres	Acres	Percent	Percent	Percent	Percent	Percent
Oregon								
56H	41	1,676	-	47.8	1.0	50.9	.3	100.0
56D	30	1,412	-	50.0	2.6	47.4	-	100.0
Washington								
46	32	1,823	-	51.1	1.3	44.5	3.1	100.0
56C	41	1,465	-	49.3	.8	49.8	.1	100.0
56A	63	1,259	-	50.4	.1	48.8	.7	100.0
56B	58	488	.7	52.5	15.4	31.4	-	100.0
74	24	472	1.8	55.6	2.9	38.6	1.1	100.0
Idaho								
56E	33	665	.2	53.5	1.8	44.5	-	100.0
79	15	1,116	-	48.4	5.0	40.3	6.3	100.0
90	23	942	-	51.1	.8	42.0	6.1	100.0
91A	29	642	-	50.0	3.9	42.5	3.6	100.0
92A	15	740	-	44.2	11.9	42.6	1.3	100.0
Total	404	1,085	.1	50.2	2.5	45.9	1.3	100.0

Although single- and tandem-disk harrows were common to most areas of the Northern Great Plains (tables 8 and 9), there was a tendency for the single-disk harrow to appear in largest numbers on the smaller general farms of the more easterly areas, whereas the tandem-disk harrow was found in greatest numbers on the larger, more specialized farms in the more westerly areas. Single-disk harrows of 8-foot widths and double-disk harrows of 10- or 11-foot widths were the most common sizes.

In the Pacific Northwest single-disk harrows were not reported to any extent (table 10). Tandem-disk harrows were reported in appreciable numbers only in areas 56A and 56B of Washington, areas 56H of Oregon and 79 and 56E of Idaho (table 11).

Spike-tooth harrows were reported in substantial numbers in both the Northern Great Plains and in the Pacific Northwest. In both of these regions those of from 18- to 21-foot widths were the most common sizes (tables 12 and 13). Spring-tooth harrows were recorded only for the Northern Great Plains (table 14), and were of minor importance in practically all areas.

Duckfoot cultivators in the Northern Great Plains were of minor importance in most areas except Montana (table 15). Rod weeders were confined almost exclusively to the north central Montana areas and southeastern Wyoming (table 16). The 9-foot field cultivator and the 12-foot weeder were the most usual sizes.

Rod weeders were recorded in appreciable numbers in all areas of the Pacific Northwest (table 17). The 12-foot machines were the most usual size. Duckfoot cultivators were of minor importance in the Pacific Northwest (table 18).

Packers occurred in all areas of the Northern Great Plains, but were reported in greatest numbers in North Dakota (table 19). Those of $2\frac{1}{2}$- to $3\frac{1}{2}$-foot width were the most common sizes. In the Pacific Northwest, packers were not found to any extent except in area 56B of Washington and area 79 of Idaho (table 20).

Listers and lister cultivators in the Northern Great Plains (table 21) were confined almost exclusively to western South Dakota, northwestern Nebraska, and southeastern Wyoming. The 2-row implement was the most common size. Listers and lister cultivators were not reported in the Pacific Northwest.

Disk drills were the common type of grain drill on farms in the Northern Great Plains and those of 10 or 11 foot widths were the most usual (table 22). Deep-furrow drills were of minor importance except in type-of-farming area 115 of Montana and in southeastern Wyoming (table 23). Press drills were not reported to any extent in any area (table 24).

Grain drills (table 25) were not tabulated by type in the Pacific Northwest, but disk drills were of first importance, followed by hoe drills, with a limited number of shoe, deep-furrow, and press drills. The usual sizes of disk drills were 9 or 10 feet, whereas hoe drills of 10- or 11-foot widths were the most usual.

Row planters and row-shovel cultivators (table 26) were reported in substantial numbers in most areas of the Northern Great Plains except in the more westerly areas of Montana where the acreage of row crops is limited. Two-row planters and one-row cultivators were the most usual sizes. These implements were not reported to any extent in the Pacific Northwest (table 27).

Potato planters and diggers (table 28) were recorded in the Northern Great Plains in substantial numbers only in northwestern Nebraska and in the upper Red River Valley of Minnesota. The 1-row machine was the most usual size. These implements were not reported on farms in the Pacific Northwest.

Grain binders in the Northern Great Plains were reported in substantial numbers in all areas, while headers were confined chiefly to the larger more specialized wheat farms in the more westerly areas (table 29). Eight-foot binders and twelve-foot headers were the most common sizes. Combines were not found to any extent except in the more westerly areas of the Dakotas and in the areas surveyed in Nebraska, Wyoming, and Montana (table 30). Those of 12 foot-width were the most usual size. Windrowers were of minor importance (table 31).

Grain binders in the Pacific Northwest were reported in substantial numbers in most areas except those in Idaho whereas headers were not common except in areas 46 and 56A of Washington (table 32). Binders of 6-foot width and headers of 14-foot width were the most usual sizes (table 32). Combines were common to all areas (table 33). Those of 16-foot width were the most common size.

Row binders occurred in substantial numbers in most areas of Minnesota and North and South Dakota whereas corn pickers were of minor importance in the Northern Great Plains. Corn pickers occurred in limited numbers in southwestern Minnesota and in certain areas of South Dakota (table 34). One-row machines were the ones in almost universal use. Row binders and corn pickers were not found on farms in the Pacific Northwest.

Mowers and sulky rakes were common in all areas of the Northern Great Plains and the Pacific Northwest (tables 35 and 36). The 5-foot mower and the 10-foot rake were the most common sizes.

Table 3. - Moldboard plows of different sizes reported by type-of-farming area, Northern Great Plains, 1933

State and type-of-farming area	Farms	Moldboard plows	Size of moldboard plow							
			1-bottom 12-16 inch	2-bottom 10-13 inch	2-bottom 14-16 inch	3-bottom 12-16 inch	4-bottom 12-16 inch	5-bottom 14 inch	6-bottom 14 inch	7-bottom 14 inch	8-bottom 14 inch
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minn.											
225A	43	97	6		59	25	7				
226	16	30	11	4	10	5					
225D	20	37	5		22	7	2				1
227A	25	43	9	1	25	8					
227B	29	51	13	3	30	5					
No. Dak.											
225B	12	24			14	7	2		1		
173	34	60	5		34	12	9				
174A	52	115	8		76	25	4		1	1	
168	40	94	7		49	30	8				
169	36	73	1	1	25	33	11	2			
172	55	51	9	4	29	8	1				
170	37	75	9	9	36	15	5				1
171	48	82	5	2	41	21	12	1			
136	70	125	18	2	45	36	24				
139	19	28	2		11	13	2				
166	40	77	4		28	31	14				
So. Dak.											
181	32	54	9		31	10	4				
182A	27	53	9	4	36	4					
174B	31	56	2		35	14	4		1		
180	30	56	13	5	28	8	2				
176	41	88	16	3	29	32	8				
179	19	22	9	2	5	5	1				
182B	26	13	8	2	1	2					
175	29	48	8	2	17	12	9				
142A&177	27	39	6	9	10	12	2				
Nebraska											
184	47	73	18	11	20	19	5				
185	22	34	3	10	3	18					
Montana											
137A	34	67	18	4	25	19	1				
119B	23	44	7	1	14	17	5				
118	29	45	10		11	21	2		1		
113	50	51	9	1	6	26	9				
114	46	34	14	1	6	10	3				
115	26	7	1		1	5					
116	41	7	2	2	3						
87D	22	36	10	4	12	10					
88A	42	58	5	8	21	21	3				
120	20	28	5		10	13					
Wyoming											
146A	30	53	3	2	5	21	2				
Total	1,270	2,008	297	97	865	580	161	3	4	1	2

Table 4. - Disk plows of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Disk plows	Size of disk plows							
			10-12 inch	18-30 inch	31-42 inch	43-53 inch	55-66 inch	67-78 inch	79-90 inch	91-110 inch
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
North Dakota										
172	55	3		1		1	1			
170	37	2		2						
166	40	1			1					
South Dakota										
176	41	1	1							
179	19	6	1	2	2	1				
182B	26	2	1	1						
142A and 177	27	2	1	1						
Nebraska										
184	47	1				1				
Montana										
118	29	4		4						
113	50	26		3	6	11	7			
114	46	28		3	11	11	3			
115	26	28		1	8	8	7	2	1	1
116	41	40		10	12	10	4	1	2	1
87D	22	2		1		1				
88A	42	5		5						
120	20	2		1	1					
Total	568	153	4	35	40	44	22	3	3	2

Table 5. - Vertical disk plows of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Vertical disk plows	Size of vertical disk plows						
			5-foot	6-foot	7-foot	8-foot	9-foot	10-foot	12-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota									
225A	43	8		3	1	3		1	
225D	20	2				1	1		
North Dakota									
225B	12	4		1		3			
174A	52	1					1		
168	40	13		1		7	5		
169	36	1				1			
172	55	1				1			
171	48	6				5	1		
136	70	17			1	7	7	2	
139	19	3			1			2	
166	40	2				1	1		
South Dakota									
176	41	1						1	
179	19	2		1			1		
182B	26	2				1			1
175	29	4				1	2	1	
142A and 177	27	4				3		1	
Nebraska									
184	47	6		1	1	2	3		
185	22	5		1		4			
Montana									
137A	34	1				1			
119B	23	1				1			
113	50	35			2	6	19	8	
114	46	41		1	1	13	10	15	1
115	26	16			3	2	3	8	
116	41	28	1		1	8	7	10	1
87D	22	2		2					
88A	42	11		3	1	3	3	1	
120	20	9		2		2	3	2	
Wyoming									
146A	30	25		3	4	3	6	9	
Total	980	251	1	18	16	79	73	61	3

Table 6. - Moldboard plows of different sizes reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Moldboard plows	Size of moldboard plows									
			1-bottom 12-16 inch	2-bottom 10-16 inch	3-bottom 10-18 inch	4-bottom 14-16 inch	5-bottom 12-16 inch	6-bottom 14-16 inch	8-bottom 14-16 inch	9-bottom 14-16 inch	12-bottom 14 inch	16-bottom 16 inch
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon												
56H	41	80	1	12	59	4	1	3				
56D	30	59	3	8	23	20	1		3	1		
Washington												
46	32	39		11	26	1	1					
56C	41	133	6	62	46	9	4	1	2	1	1	1
56A	63	81	4	33	39	4			1			
56B	58	97	13	32	33	13	2	3	1			
74	24	48	16	20	11	1						
Idaho												
56E	33	60	8	10	34	5			3			
79	15	26	2	10	10	3	1					
90	23	50	9	16	18	6	1					
91A	29	29	13	12	3	1						
92A	15	38	12	8	4	4						
Total	404	730	87	234	306	71	11	7	10	2	1	1

Table 7. - Vertical disk plows of different sizes reported by type-of-farming area, Pacific Northwest, 1933

State and type-of-farming area	Farms	Vertical disk plows	Size of vertical disk plows					
			5-foot	6-foot	7-foot	8-foot	9-foot	10-foot
	Number	Number	Number	Number	Number	Number	Number	Number
Oregon								
56H	41	3		3				
Washington								
46	32	10		1	1		3	5
56C	41	7				2		5
56A	63	39		22	3	6	4	4
56B	58	2						2
Idaho								
70	15	5			1	2		2
90	23	1		1				
92A	15	4	1		1	2		
Total	288	71	1	27	6	12	7	18

Table 8. - Single disk harrows of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Single disk harrow	Size of single-disk harrows											
			6-foot	7-foot	8-foot	9-foot	10-foot	11-foot	12-foot	13-foot	14-foot	15-foot	16-foot	20-foot	21-foot	24-foot	26-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota																	
225A	43	41		1	19	5	13				1			2			
226	16	8	1	2	4										1		
225D	20	25			17	2	3	1	1						1		
227A	25	23		3	5	6	7				2						
227B	29	35			11	6	15		1		2						
North Dakota																	
225B	12	7			6				1								
173	34	33			13		18				1				1		
174A	52	50	1	1	21	6	20							1			
168	40	33			25		4						2		1	1	
169	36	34		3	15		15		1								
172	55	35		5	26		4										
170	37	22	2	5	13		2										
171	48	18	1		16		1										
136	70	29	1	2	15	1	4						1		5		
139	19	11		2	7										1		1
166	40	24	1	1	18	1	3										
South Dakota																	
181	32	22		2	8	2	9		1								
182A	27	38		1	15	5	16					1					
174B	31	25			11	2	11					1					
180	30	30			13	6	9				2						
176	41	43		1	14	3	20	1			4						
179	19	17			9		1	1	2		2	1			1		
182B	26	24			6	8	9						1				
175	29	16		1	5	3	5	1		1							
142 and 177	27	15		1	7		3				3				1		

Table 8. - Single disk harrows of different sizes reported by type-of-farming areas, Northern Great Plains, 1933 - Continued

State and type-of-farming area	Farms	Single disk harrow	Size of single-disk harrows																
			6-foot	7-foot	8-foot	9-foot	10-foot	11-foot	12-foot	13-foot	14-foot	15-foot	16-foot	20-foot	21-foot	24-foot	26-foot		
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number		
Nebraska																			
184	47	26	1	4	15	1	4				1								
185	22	13		1	9	1	1				1								
Montana																			
137A	34	16		1	14		1												
119B	23	11		4	5		1		1										
118	29	19		1	18														
113	50	11		1	6		2								2				
114	46	14			13										1				
115	26	6			2		2				1			1					
87D	22	12		2	9		1												
88A	42	20		2	6		12												
120	20	3		1	1	1													
Wyoming																			
146A	30	16		9						1					6				
Total	1229	825	8	57	417	59	216	4	8	2	20	3	4	4	21	1	1		

Table 9. - Tandem-disk harrows of different sizes reported by type-of-farming areas, Northern Great Plains, 1938

State and type-of-farming area	Farms	Tandem-disk harrow	Size of tandem-disk harrows					
			6-7 foot	8-9 foot	10-11 foot	12-14 foot	16-foot	24-foot
	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota								
225A	43	7		4	3			
226	16	1		1				
225D	20	2		2				
227A	25	6	1	2	3			
227B	29	2		1	1			
North Dakota								
225B	12	3		3				
173	34	15		5	10			
174A	52	12		3	7	2		
168	40	14		11	3			
169	36	6		3	3			
172	55	16	1	3	12			
170	37	20	3	8	9			
171	48	34	2	9	23			
136	70	45	1	6	37		1	
139	19	11	1	4	5	1		
166	40	26		8	18			
South Dakota								
181	32	8	2	4	2			
182A	27	2			2			
174B	31	12		6	6			
180	30	7			7			
176	41	21			21			
179	19	10			10			
182B	26	6		5	1			
175	29	21		4	17			
142A and 177	27	22		15	7			
Nebraska								
184	47	35	7	13	15			
185	22	27	6	13	7		1	
Montana								
137A	34	20		13	7			
119B	23	12		2	9	1		
118	29	12	2	2	8			
113	50	39	2	7	29	1		
114	46	36		7	27	1		1
115	26	29		3	26			
116	41	35	3	7	25			
87D	22	10		7	3			
88A	42	28		25	3			
120	20	17	2	6	9			
Wyoming								
146A	30	9	1	5	3			
Total	1,270	638	34	217	378	6	2	1

Table 10. - Single-disk harrows of different sizes reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Single-disk harrow	Size of single-disk harrows						
			6-foot	7-foot	8-foot	9-foot	10-foot	11-foot	12-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon									
56D	30	3			2		1		
Washington									
56C	41	4				1	1		2
56A	63	8			2		3	1	2
56B	58	6		2	4				
74	24	9	1	2	6				
Idaho									
56E	33	1			1				
90	23	1	1						
91A	29	3			3				
92A	15	3		1	2				
Total	316	38	2	5	20	1	5	1	4

Table 11. - Tandem-disk harrows of different sizes reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Tandem-disk harrow	Size of tandem-disk harrows											
			5-foot	6-foot	7-foot	8-foot	9-foot	10-foot	11-foot	12-foot	14-foot	15-foot	16-foot	22-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon														
56H	41	28				22		2	3	1				
56D	30	11				3		7		1				
Wash.														
46	32	5				2	2	1						
56C	41	4				2	2							
56A	63	26				12		14						
56B	58	52	1	6	8	22	1	14						
74	24	5			1	3		1						
Idaho														
56E	33	37		2		25		7				1	2	
79	15	16			1	12		3						
90	23	8				6							1	1
91A	29	4			1	3								
92A	15	3				1		2						
Total	404	199	1	8	11	113	5	51	3	2		1	3	1

Table 12. - Spike-tooth harrows of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Spike-tooth harrows	Size of spike-tooth harrows							
			8-10 foot	11-14 foot	15-17 foot	18-21 foot	22-24 foot	25-28 foot	29-32 foot	33-37 foot	38-60 foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota											
225A	43	47			1	5	32	9			
226	16	16	2		3	5	3	3			
225D	20	20		1	2	4	4	7	11		1
227A	25	27			2	17		7	1		
227B	29	32	1		1	11	6	13			
North Dakota											
225B	12	12			1		9	2			
173	34	30		1	8	12	6	3			
174A	52	60				12	19	25		4	
168	40	53				2	18	11	6	10	6
169	36	32	1	1		6	11	12	1		
172	55	56	3	2	5	16	20	8	2		
170	37	43	2	1	5	11	8	16			
171	48	52		5	6	27	9	3	2		
136	70	76	1	1	7	30	15	19	3		
139	19	21	1		1	5	5	5	3	1	
166	40	42	1	1	1	4	8	21	2	3	1
South Dakota											
181	32	36	1		1	11	6	15	1	1	
182A	27	31			1	20	2	7		1	
174B	31	35				6	16	11	1		1
180	30	33	1		1	24	4	2	1		
176	41	39				14	9	13	3		
179	19	16			10	3	3				
182B	26	23	2	1	11	9					
175	29	30	4		5	7	7	6		1	
142A and 177	27	32	2		3	20	1	4	2		
Nebraska											
184	47	47	6	6	16	14	1		2	2	
185	22	24		1	11	9	1		1	1	
Montana											
137A	34	37		1	11	17	1	2	5		
119B	23	25	1	3	4	8	2	1	4		22
118	29	34	5		3	15	5	4	1	1	
113	50	48	4		2	14	10	4	9	2	3
114	46	49	7	3	10	13	1	1	10		4
115	26	24	1		2	9		2	6		4
116	41	47	6	6	13	11	2	1	7		1
87D	22	50	1	8	4	11	10	6	9		1
88A	42	23	3	1	12	2		2	3		
120	20	20		1	4	11		2	2		
Wyoming											
146A	30	26	2	2	14	6	1		1		
Total	1270	1348	58	46	181	421	255	247	89	27	24

Table 13. - Spike-tooth harrows of different sizes reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Spike-tooth harrows	Size of spike-tooth harrows										
			8-10 foot	11-14 foot	15-17 foot	18-21 foot	22-24 foot	25-28 foot	29-32 foot	33-37 foot	38-60 foot	61-79 foot	80-100 foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon													
56H	41	54			1	13	12	7	6	3	9	3	
56D	30	36				1	7		6	2	18	2	
Washington													
46	32	33				8	3	10	7	1	2	2	
56C	41	93		1	1	32	47	2	2	1	5	2	
56A	63	75				5	10	8	24	7	11	7	3
56B	58	72	3	2	10	31	5	9	1	1	8	2	
74	24	27	1		8	3	7	2	2	2	2		
Idaho													
56E	33	37			3	7	10	3	7	1	5		1
79	15	3		1	2								
90	23	24		2	5	10	1	1	1	2	1	1	
91A	29	38	6	5	11	7		1	6	1	1		
92A	15	16	8	1	1	2			4				
Total	404	508	18	12	42	119	102	43	66	21	62	19	4

Table 14. - Spring-tooth harrows of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming areas	Farms	Spring-tooth harrows	Size of spring-tooth harrows				
			4-8 foot	9-14 foot	15-18 foot	20-24 foot	25-28 foot
	Number	Number	Number	Number	Number	Number	Number
Minnesota							
225A	43	11	5	4		2	
226	16	10	7	3			
225D	20	8		8			
227B	29	7	5	2			
North Dakota							
225B	12	3	1	2			
173	34	22		17	3	1	1
174A	52	8	1	6	1		
168	40	8	1	4	3		
169	36	8	2	6			
172	55	9	3	6			
170	37	3	1	1	1		
171	48	2	1			1	
136	70	6		6			
139	19	2		2			
166	40	5	1	3			1
South Dakota							
181	32	1	1				
174B	31	1			1		
180	30	1		1			
176	41	1				1	
179	19	2		2			
142A and 177	27	4	1	3			
Nebraska							
185	22	1			1		
Montana							
137A	34	1	1				
119B	23	7	1	5	1		
118	29	3		3			
113	50	19		11	6	2	
114	46	7	1	5	1		
115	26	4		2		1	1
116	41	4	1	2	1		
88A	42	5	4	1			
Wyoming							
146A	30	2		2			
Total	1,074	175	38	107	19	8	3

Table 15. - Duckfoot cultivators of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Duckfoot cultivators	Size of duckfoot cultivators							
			7-foot	8-foot	9-foot	10-foot	11-foot	12-foot	14-foot	16-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota:										
225A	43	24	4	6	8	4	1	*1		
226	16	2	1		1					
225D	20	14	2	4	4	2	1	1		
227A	25	4		1	1	2				
227B	29	2				2				
No. Dak.										
225B	12	9	1	4		2		2		
173	34	12	1		4	2	1	4		
174A	52	9		2	3			2	2	
168	40	27	3	8	7	3		5	1	
169	36	12		3	4	4		1		
172	55	1						1		
170	57	3		1		1		1		
171	48	3		3						
136	70	15		2	4	2	3	4		
139	19	12	3	4	1	4				
166	40	17		3	2	4		8		
So. Dak.										
181	38	17	4	2	6	1	2	2		
182A	27	2		1		1				
174B	31	3			2		1			
176	41	1						1		
Nebraska										
185	22	2				1		1		
Montana										
137A	34	13		1	8	2	1	1		
119B	23	11		3	3	4		1		
118	29	29	2	2	2	15	3	4		1
113	50	42		3	21	7	2	9		
114	46	37	1		2	8	4	21	1	
115	26	26		1	8	6		11		
116	41	29	3	2	10	9	1	4		
57D	22	4		1		2		1		
88A	42	27	6	6	12	3				
120	20	18	3	1	3	7		4		
Wyoming										
146A	30	2	1			1				
Total	1,092	429	35	64	116	99	20	90	4	1

Table 16. - Rod weeders of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Rod weeders	Size of rod weeders										
			7-foot	8-foot	10-foot	11-foot	12-foot	13-foot	14-foot	15-foot	16-foot	18-foot	20-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
No. Dak.													
174A	82	1			1								
172	55	1					1						
170	37	1					1						
So. Dak.													
181	32	1					1						
174B	31	1				1							
180	30	1				1							
175	29	1					1						
172A & 177	27	1			1								
Nebraska													
184	47	1					1						
Montana													
137A	34	2		1	1								
119B	23	2					2						
118	29	2		1	1								
113	50	17			5		7		1	1			3
114	46	17			4		9					3	1
115	26	21			10		10						1
116	41	1			1								
87D	22	4	1		3								
88A	42	2									2		
Wyoming													
146A	30	10			1		8	1					
Total	683	87	1	2	28	2	41	1	1	1	2	3	5

Table 17. - Rod weeders of different sizes, reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Rod weeders	Size of rod weeders																
			7-foot	8-foot	9-foot	10-foot	11-foot	12-foot	13-foot	14-foot	15-foot	16-foot	18-foot	20-foot	22-foot	24-foot	32-foot	36-foot	40-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon																			
56H	41	76		1		3		67			1	2		1		1			
56D	30	90				4	9	62		5		3		2		4		1	
Washington																			
46	32	51					1	40		8		1					1		
56C	41	115		1	1	14	6	81				7	1	1		3			
56A	63	109				2		97		4		2		3					1
56B	58	47	1			6		33	1	1				2		3			
74	24	18	1	2		2		8		1		2	2						
Idaho																			
56E	33	36			3	7	3	21	1	1									
79	15	6						4								2			
90	23	33		5		2		22	2				1			1			
91A	29	25				4		18				1			1	1			
92A	15	14				1		10		2		1							
Total	404	620	2	9	4	45	19	463	4	22	1	19	4	9	1	15	1	1	1

Table 18. - Duckfoot cultivators of different sizes reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Duck-foot culti-vators	Size of duckfoot cultivators									
			6-foot	7-foot	8-foot	9-foot	10-foot	11-foot	12-foot	14-foot	15-foot	16-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Washington												
46	32	9				9						
56A	63	12				8			1		3	
56B	58	10	1	1		6	1	1				
74	24	2		1		1						
Idaho												
56E	33	6	1			1	1		3			
79	15	1					1					
90	23	6				5	1					
92A	15	2							1			1
Total	263	48	2	2		30	4	1	5		3	1

Table 19. - Packers of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Packers	Size of packers									
			2½-3½ foot	4-4½ foot	5-6 foot	7-8 foot	9-10 foot	11-12 foot	13-14 foot	15-16 foot	18-20 foot	24-30 foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Montana												
225A	43	12				1	3	4		2		2
226	16	3				1	1	1				
225D	20	6				1	4	1				
227A	25	5					3	1			1	
227B	29	1					1					
No. Dak.												
225B	13	9	2		2	1		2	1	1		
173	34	14		1	2	1	5	3	1			1
174A	52	8			1	1	5		1			
168	40	11				1		2	3	5		
169	36	43	31	5	5			2				
172	55	11	2	2	2	1	2	2				
170	37	18	1	1	1	4	7	3		1		
171	48	19	7	2	3	1	5	1				
136	70	25	3	6	7	1	4	2		2		
139	19	11	6	3		1	1					
166	40	27	10	4	3		4	5	1			
So. Dak.												
181	32	7				1	2	1	2	1		
174B	31	1							1			
180	30	1				1						
176	41	4		1			1		2			
179	19	2						1	1			
182B	26	2				2						
175	29	13	2	4	3		3	1				
142A & 177	27	3				1		1		1		
Nebraska												
184	47	6				3	1	2				
185	22	5	1			1	1			2		
Montana												
137A	34	5	2			1			1	1		
119B	23	9	4	3	1			1				
118	29	2							1	1		
113	50	15	5	1	2	1	4			1	1	
114	46	13				4	2	3	4			
115	26	3				1	1					1
116	41	9					4	3	2			
87D	22	9			1	3	2	2				1
88A	42	11				1	4	1	4	1		
120	20	5	2				2			1		
Wyoming												
146A	30	1					1					
Total	1,243	349	78	33	33	35	73	45	25	20	2	3	2

Table 20. - Packers of different sizes reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Packers	Size of packers																
			4-foot	5-foot	6-foot	7-foot	8-foot	9-foot	10-foot	11-foot	12-foot	13-foot	14-foot	15-foot	16-foot	17-foot	18-foot	20-foot	32-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon																			
55H	41	6	4			2													
56D	30	3	1	1						1									
Washington																			
46	32	8							1	1	2		1	1			1	1	
56C	41	2							1						1				
56A	63	3						1			2								
56B	58	35				1	5		2	3	8	3	2	3	4	1	2		1
74	24	3							1									2	
Idaho																			
56E	33	7									1			3	3				
79	15	16					2		2		3		1	5	2			1	
91A	29	6							4		2								
92A	15	3									1		1	1					
Total	381	92	5	1		3	7	1	11	5	19	3	5	13	10	1	3	4	1

Table 21. - Listers and lister cultivators of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Listers	Size of listers			Lister cultivators	Size of lister cultivators				
			1-row	2-row	3-row		1-row	2-row	3-row	4-row	5-row
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
North Dakota											
170	37	2		2		2		2			
171	48	3		3							
South Dakota											
182A	27	1	1								
180	30	3	1	2		3		2	1		
176	41	6	1	5		9	1	8			
179	19	24	7	17		22	2	14	2	3	1
182B	26	31	17	13	1	20	1	16	1	2	
175	29	4		4		5		4		1	
142A and 177	27	14	3	11		11		5	2	4	
Nebraska											
184	47	44	14	26	4	40	3	25	9	3	
185	22	22	3	17	2	20		16	2	2	
Montana											
137A	34	9	7	2		8	1	7			
119B	23	1	1								
118	29	3	2	1		4		4			
114	46	1		1							
88A	42	3	3								
120	20	2		2		1		1			
Wyoming											
146A	30	22	1	15	6	18	1	9	7	1	
Total	577	195	61	121	13	163	9	113	24	16	1

Table 22. - Disk drills of different sizes reported by type-of-farming areas, Northern Great Plains, 1935

State and type-of-farming area	Farms	Disk drills	Size of disk drills						
			6-7 foot	8-9 foot	10-11 foot	12-13 foot	14-15 foot	16-17 foot	18-21 foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota									
225A	43	46			41	2	3		
226	16	16	3	4	9				
225D	20	22			20		2		
227A	25	23		3	20				
227B	29	30		5	23	1			1
North Dakota									
225B	12	16		1	14	1			
173	34	27			22	1	4		
174A	52	72		2	61	7	2		
168	40	52	1		49		2		
169	36	31			31				
172	55	57		4	44	7	2		
170	37	34		9	24	1			
171	48	52	1	1	49	1			
136	70	75		1	61	6	6	1	
139	19	22		1	17	3	1		
166	40	42		1	25	4	10	2	
South Dakota									
181	32	33			27	2	3		1
182A	27	7			7				
174B	31	34		3	23	8			
180	30	21	2	4	14	1			
176	41	42		1	32	3	6		
179	19	21		2	9	2	8		
182B	26	19	3	3	11	1	1		
175	29	35	1	1	27	3	3		
142A and 177	27	25		4	18		3		
Nebraska									
184	47	40	3	17	17	3			
185	22	17		8	7	1	1		
Montana									
137A	34	35		7	19	3	6		
119B	23	28			14	11	3		
118	29	33		3	27		2	1	
113	50	60		12	41	6	1		
114	46	53		3	28	13	9		
115	26	27		6	12	8	1		
116	41	58		4	51	3			
87D	22	48	2	18	23	5			
88A	42	25	1	17	6	1			
120	20	23	2	4	6	8	3		
Wyoming									
146A	30	20	1	3	9	6	1		
Total	1,270	1,321	20	152	938	122	83	4	2

Table 23. - Deep-furrow drills of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Deep-furrow drills	Size of deep-furrow drills							
			4-foot	7-foot	8-foot	9-foot	10-foot	12-foot	14-foot	16-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota:										
225A	45	1					1			
No. Dak.										
172	55	1					1			
So. Dak.										
176	41	1	1							
182B	26	2					1	1		
142A & 177	27	1						1		
Nebraska										
184	47	3						3		
185	22	5			2		1	1	1	
Montana										
113	50	3					2	1		
114	46	1				1				
115	26	21			1		9	10	1	
116	41	1							1	
87D	22	2						1	1	
88A	42	1					1			
Wyoming										
146A	30	21		1			9	5	4	2
	518	64	1	1	3	1	25	23	8	2

Table 24. - Press drills of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Press drills	Size of press drills								
			4-foot	5-foot	7-foot	8-foot	9-foot	10-foot	11-foot	12-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota:										
225A	43	2					1	1		
No. Dak.										
225B	12	2						2		
173	34	10				1		7	1	1
174A	52	1						1		
169	36	8	3	2				3		
172	55	1						1		
170	37	3						3		
166	40	13	3	2				7	1	
So. Dak.										
180	30	3			1				2	
175	29	2		1					1	
142 & 177	27	2				1		1		
Nebraska										
184	47	4				1		3		
185	22	9				4	1	4		
Montana										
137A	34	1						1		
113	50	4				1		3		
114	46	1						1		
116	41	2					1	1		
120	20	1						1		
Wyoming										
146A	30	4					1	1		2
Total	685	73	6	5	1	8	4	41	5	3

Table 25. - Grain drills of different sizes reported by type-of-farming area, Pacific Northwest, 1933

State and type-of-farming area	Farms	Grain drills	Size of grain drills								
			6-foot	7-foot	8-foot	9-foot	10-foot	11-foot	12-foot	14-foot	18-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon											
56H	41	81			1	15	19	34	12		
56D	30	102				41	13	29	10	4	5
Washington											
46	32	55			2	7	9	33	4		
56C	41	138		1		78	29	23	7		
56A	63	122			1	15	48	30	28		
56B	58	71			8	9	42	7	5		
74	24	28			6	4	15		3		
Idaho											
56E	33	42			5	6	14	6	11		
79	15	21			2	2	11		6		
90	24	34		1	7	9	10	7			
91A	29	41	2	4	15	12	3	1	3	1	
92A	15	18	1	2	4	6	2	1		2	
Total	405	753	3	8	51	204	215	171	89	7	5

Table 26. - Row planters and row shovel cultivators of different sizes, reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Row planters	Size of row planters: 1-row	2-row	3-row	4-row	Row shovel cultivators	Size of row shovel cultivators: 1-row	2-row	3-row	4-row
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota											
225A	43	28	3	24	1		63	54	7	2	
226	16	14		14			17	17			
225D	20	17	4	13			32	23	6		3
227A	25	26	2	21		3	49	18	29		2
227B	29	30	1	28		1	57	26	30		1
North Dakota											
225B	12	8		8			14	13	1		
173	34	29		29			41	34	7		
174A	52	28	1	26	1		48	34	13	1	
168	40	5		5			9	8	1		
169	36	16	1	15			26	21	5		
172	55	49		49			82	58	24		
170	37	33		33			47	37	10		
171	48	30	3	26	1		50	42	8		
136	70	31	1	30			52	50	2		
139	19	8		7		1	10	9			1
166	40	26	1	25			36	31	5		
South Dakota											
181	32	34	1	33			64	37	27		
182A	27	29		28	1		58	23	34	1	
174B	31	36		34		2	61	22	38	1	
180	30	35		33	1	1	62	23	38	1	
176	41	46	2	27		17	91	22	61		8
179	19	12	1	11			27	20	5	1	1
182B	26	5	1	4			25	17	8		
175	29	20		18		2	36	19	15	1	1
142A & 177	27	19		19			32	20	12		
Nebraska											
184	47	10	3	7			47	30	15	2	
185	22	7	6	1			39	17	19	2	1
Montana											
137A	34	23	1	22			31	22	9		
119B [illegible]	23	10		10			14	13	1		
118	29	12	2	10			18	15	3		
113	50	9		8		1	11	9	1		1
114	46	2		2			4	4			
115	26	3	2	1			4	4			
116	41	4		4			5	5			
88A	42	1		1			1	1			
120	20	4		4			6	3	3		
Wyoming											
146A	30	7		6	1		32	14	14	4	
Total	1,248	706	36	636	6	28	1,301	815	451	16	19

Table 27. - Row planters and row shovel cultivators of different sizes reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Row planters	Size of row planters: 1-row	Size of row planters: 2-row	Row shovel cultivators	Size of row shovel cultivators: 1-row	Size of row shovel cultivators: 2-row	Size of row shovel cultivators: 3-row
	Number	Number	Number	Number	Number	Number	Number	Number
Oregon								
56D	30	1	1					
Washington								
56A	63				4	1	3	
56B	58	2	1	1	7	5	2	
74	24	1		1	8	8		
Idaho								
56E	33	1		1	4	4		
91A	29				1			1
Total	237	5	2	3	24	18	5	1

Table 28. - Potato planters and diggers of different sizes, reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Potato planters	Size of potato planters: 1-row	2-row	3-row	Potato diggers	Size of potato diggers: 1-row	2-row
	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota:								
225A	43	23	16	7		24	24	
226	16	3	3			4	4	
225D	20	13	13			12	12	
227A	25	1	1			2	2	
227B	29					1	1	
No. Dak.								
225B	12	3	1	2		3	3	
173	34	1		1				
168	40	2	2			1	1	
169	36	2	2			1	1	
172	55					1	1	
170	37	1	1			1	1	
136	70	1	1					
139	19	1	1			1	1	
166	40	6	6			4	4	
So. Dak.								
181	32	13	11	2		11	10	1
182A	27	1		1		1	1	
174B	31	3	3			3	3	
180	30	1	1			2	2	
176	41	3	3			1	1	
182B	26					1	1	
175	29	2	2			1	1	
142A & 177	27					1	1	
Nebraska								
184	47	14	11	3		16	16	
185	22	18	9	8	1	22	18	4
Montana								
137A	34					1	1	
114	46	2	2			3	3	
115	26	2	2			1	1	
116	41	1	1			1	1	
88A	42	1	1			2	2	
Wyoming								
146A	30	5	3	2		5	5	
Total	1,007	123	96	26	1	127	122	5

Table 29. - Grain binders and headers of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Grain binders	Size of grain binders					Headers	Size of headers				
			6-foot	7-foot	8-foot	10-foot	12-foot		8-foot	10-foot	12-foot	14-foot	16-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota													
225A	43	64		27	34	3							
226	16	18	2	10	6								
225D	20	28	1	12	14	1		1					1
227A	25	29		8	15	6							
227B	29	33	4	8	21								
No.Dakota													
225B	12	16		13	2	1							
173	34	43		3	33	7							
174A	52	50		2	46	2		1			1		
168	40	72		5	66	1							
169	36	66		13	47	6		3		1	2		
172	55	51		2	47	2		42	1	1	39	1	
170	37	34	5	2	24	3		33		5	28		
171	48	44		1	35	1	7	39		1	37	1	
136	70	83		13	66	4		2			1	1	
139	19	19		4	13	2							
166	40	60			49	11		3			3		
So.Dakota													
181	32	39		16	16	6	1						
182A	27	28		1	24	3		2			2		
174B	31	39		1	32	4	2	3			3		
180	30	34			28	4	2	3			2	1	
176	41	44			26	17	1	13	1		11	1	
179	19	16			13	3							
182B	26	24			19	5							
175	29	24			18	5	1	20			18	2	
142A & 177	27	25	2	1	13	8	1	1	1				
Nebraska													
184	47	40	2	2	25	11		5			5		
185	22	21		1	16	4		1			1		
Montana													
137A	34	29		5	24			8			8		
119B	23	16		3	12	1		10			9	1	
118	29	25		5	18	2		1		1			
113	50	31		1	22	3	5	15			11	4	
114	46	26		1	21	1	3	1			1		
115	26	13			13			1				1	
116	41	21		2	19			2		1		1	
87D	22	25	5	7	11	1	1	4			4		
88A	42	38	10	4	24								
120	20	18	2	2	14			8			7		1
Wyoming													
146A	30	12	1	3	8			5			3	2	
Total	1,270	1,298	34	178	934	128	24	227	3	10	196	16	2

Table 30. - Combined harvester threshers of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Combines	Size of combines							
			8-foot	10-foot	12-foot	14-foot	15-foot	16-foot	18-foot	20-foot	24-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota											
225A	43	1			1						
225D	20	1						1			
North Dakota											
225B	12	2		2							
173	34	1						1			
169	36	1			1						
172	55	3			2					1	
171	48	10			7			3			
136	70	20		3	10	1	1	5			
139	19	10	1		7			2			
166	40	2		1	1						
South Dakota											
181	32	1			1						
174B	31	1					1				
176	41	5			1			4			
179	19	7			3	1		3			
182B	26	3			2					1	
175	29	7						2		5	
142A and 177	27	10	2	2	5	1					
Nebraska											
184	47	16		3	10		1	2			
185	22	13			8		4	1			
Montana											
137A	34	4			3	1					
119	23	8			5			1	1	1	
118	29	14		2	7		3	2			
113	50	32		1	14		2	14		1	
114	46	28			9		3	13		3	
115	26	23		2	2	1	3	8	1	3	3
116	41	17			2		5	4		5	1
87D	22	2			1			1			
88A	42	10		3	5		1	1			
120	20	7			4	1		2			
Wyoming											
146A	30	18			14	1	3				
Total	1,014	277	3	19	125	7	27	70	2	20	4

Table 31. - Windrowers of different sizes reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Windrowers	Size of windrowers				
			10-foot	12-foot	16-foot	20-foot	24-foot
	Number	Number	Number	Number	Number	Number	Number
Minnesota							
225A	43	2	1		1		
225D	20	3		1	2		
North Dakota							
225B	12	2		1			
173	34	2			2		
169	36	1		1			
136	70	6		4	2		
166	40	1			1		
South Dakota							
181	32	1			1		
174B	31	2			1		1
176	41	4		1	3		
179	19	1	1				
182B	26	2		1		1	
175	29	3			3		
Nebraska							
184	47	4	1		3		
Montana							
137A	34	5		3	2		
119B	23	1				1	
118	29	1	1				
87D	22	1			1		
88A	42	1		1			
Total	630	43	4	13	23	2	1

Table 32. - Grain binders and headers of different sizes reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Grain binders	Size of grain binders: 5-foot	6-foot	7-foot	8-foot	10-foot	Header	Size of headers: 8-foot	12-foot	14-foot	16-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon												
56H	41	8		7	1							
56D	30	21		19		2						
Wash.												
46	32	7		3	2	2		14		2	12	
56C	41	42	1	37	4							
56A	63	43	1	15	18	9		21	1	5	15	
56B	58	27			1	23	3	8		3	3	2
74	24	22		1	14	6	1					
Idaho												
56E	33	30			10	20		1				1
79	15	1				1						
90	23	3		2		1		1		1		
91A	29	1			1			7		5	2	
92A	15	1			1							
Total	404	206	2	84	52	64	4	52	1	16	32	3

Table 33. - Combined harvester-threshers of different sizes reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Combines	Size of combines: 10-foot	12-foot	14-foot	15-foot	16-foot	18-foot	20-foot	22-foot	24-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon											
56H	41	33	1	10	4	1	12	5			
56D	30	26			4	2	11	3	5		1
Washington											
46	32	25		3		6	12	2	2		
56C	41	46		2	9	1	15	8	2	3	6
56A	63	53		10	7	5	21	1	8		1
56B	58	28		4	8	1	12	3			
74	24	10	5	3		1	1				
Idaho											
56E	33	20	1	3	3	4	8	1			
79	15	12		4			5		3		
90	23	22	6	8	1		4		3		
91A	29	20	4	14	1	1					
92A	15	11	4	4			3				
Total	404	306	21	65	37	22	104	23	23	3	8

Table 34. - Row binders and corn pickers of different sizes, reported by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming area	Farms	Row binders	Size of row binders: 1-row	Size of row binders: 2-row	Corn pickers	Size of corn pickers: 1-row	Size of corn pickers: 2-row
	Number	Number	Number	Number	Number	Number	Number
Minnesota							
225A	43	24	24				
226	16	11	11				
225D	20	12	12				
227A	25	19	19		5	2	3
227B	29	27	27		16	15	1
North Dakota							
225B	12	7	7				
173	34	18	17	1			
174A	52	21	21		3	3	
168	40	2	2				
169	36	7	7				
172	55	34	34		2	2	
170	37	26	25	1			
171	48	23	23		1	1	
136	70	8	8				
139	19	6	6				
166	40	17	16	1			
South Dakota							
181	32	25	25		5	5	
182A	27	7	7		14	13	1
174B	31	25	25		2	2	
180	30	10	10		7	6	1
176	41	18	18		11	11	
179	19	6	6		10	10	
182B	26	19	17	2	3	2	1
175	29				1	1	
142A and 177	27	12	12				
Nebraska							
184	47	2	2		1	1	
185	22	6	6		2	1	1
Montana							
137A	34	16	16				
119B	23	6	6				
118	29	3	3				
116	41	1	1				
Wyoming							
146A	30	1	1				
Total	1,064	419	414	5	83	75	8

Table 35. - Mowers and sulky rakes of different sizes reported by type-of-farming area, Northern Great Plains, 1933

State and type-of-farming area	Farms	Mowers	Size of mowers				Sulky rakes	Size of sulky rakes						
			4-foot	5-foot	6-foot	7-foot		7-foot	8-foot	9-foot	10-foot	11-foot	12-foot	14-foot	16-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Minnesota															
225A	43	50	1	44	5		42				37		5		
226	16	23		20	3		17				16		1		
225D	20	28	1	20	6	1	23				21		2		
227A	25	29		26	3		23				17		6		
227B	29	30	1	25	2	2	27				25		1	1	
No.Dakota															
225B	12	16		14	2		12				9		2	1	
173	34	45	1	43		1	33				33				
174A	52	33		32		1	51		2		46		3		
168	40	51		51			46				45	1			
169	36	40		39	1		37			1	36				
172	55	81	1	67	13		62	1			51		9		1
170	37	38	3	33	2		34				33		1		
171	48	47		46	1		45				45				
136	70	72		71	1		67				65		2		
139	19	21		20	1		19				15		3		1
166	40	46	1	44		1	41		1		35		5		
So.Dakota															
181	32	31		25	5	1	25			1	20		4		
182A	27	27	1	24	2		21			1	17		3		
174B	31	48		42	6		32				16		16		
180	30	44		35	9		33				29		3	1	
176	41	72	1	5	49	17	53	5	13		13		22		
179	19	38		3	22	13	20	1			8		11		
182B	26	22		10	12		22		1		11	1	9		
175	29	39		38		1	26		1		20		5		
142A & 177	27	29		12	15	2	29		2		20	1	4		2
Nebraska															
184	47	50	1	23	25	1	44		1		32		11		
185	22	18	1	5	12		16		1		9	1	5		
Montana															
137A	34	38	1	33	4		32				27	2	3		
119B	23	20	1	17	2		17				16	1			
118	29	28		26	2		28				23		5		
113	50	27	2	23	2		23		1		21		1		
114	46	31	3	21	6	1	30			2	24		4		
115	26	20	1	14	4	1	19				18		1		
116	41	35	1	33	1		32			1	29		2		
87D	22	25		25			17			1	16				
88A	42	48	3	45			33			2	29	2			
120	20	24		14	9	1	17				17				
Wyoming															
146A	30	23		12	10	1	21				17		4		
Total	1270	1387	25	1080	237	45	1169	7	23	9	961	9	153	3	4

Table 36. - Mowers and sulky rakes of different sizes, reported by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming area	Farms	Mowers	Size of mowers				Sulky rakes	Size of sulky rakes				
			4-foot	5-foot	6-foot	7-foot		6-foot	8-foot	9-foot	10-foot	12-foot
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Oregon												
56H	41	23		23			18	1			17	
56D	30	24		22	2		22				21	1
Washington												
46	32	10		8	1	1	11				11	
56C	41	35		35			31				30	1
56A	63	26		25	1		23				22	1
56B	58	64		54	10		54		2		51	1
74	24	16		15	1		14		1	2	11	
Idaho												
56E	33	27		27			25			1	24	
79	15	17		17			15			1	13	1
90	23	24		24			20				20	
91A	29	30	1	28	1		27			3	23	1
92A	15	17		16	1		16				16	
Total	404	313	1	294	17	1	276	1	3	7	259	6

RATES PER DAY OF DOING FIELD WORK WITH IMPLEMENTS OF DIFFERENT KINDS AND SIZES WHEN DRAWN WITH HORSES AND WITH TRACTORS

From the standpoint of least time required to perform different field operations, the implements in use should be those which, under particular soil and topographic conditions, fit the available power unit, whether it be animal power or tractor power. The level to rolling topography which prevails on grain farms in the Northern Great Plains, together with farms of relatively large size, particularly adapts the employment of tractor power on field implements to this region. The change from horses to tractors has been a fairly rapid one, and while this change has been taking place, in some instances, horse-type equipment of improper size and type has been used with tractors. Operators of such equipment cannot hope to equal the performance of other farmers who have implements properly related to their power units.

In the Pacific Northwest, where the prevailing topography is rolling to hilly, tractors have not displaced horses on grain farms as a source of power to draw field implements to so large an extent as in the Northern Great Plains, and this, in spite of the fact that the farms are larger than in the Northern Great Plains. In the Pacific Northwest, tractors have been used longer than in the Northern Great Plains. Mainly because of the steeper slopes, track-laying type tractors predominate, and the power employed to draw field implements is more in keeping with the implements in use.

The average accomplishment of field implements of most common size, when drawn with horses and with tractors, is shown for the Northern Great Plains in table 37 and for the Pacific Northwest in table 38. There are other combinations of implements and power that differ in size from those shown in these tables, of course, but only those that are in sufficient numbers to give a fairly reliable figure on accomplishment per day are shown.

Plowing with horses in the Northern Great Plains was confined mainly to 2-bottom or smaller moldboard plows. Larger plows were drawn mainly with tractors. A 5-horse team was the most common source of power used on 2-bottom moldboard plows and the addition of another horse to make a 6-horse team did not result in a greater work accomplishment per day. Likewise, an increase in motive power over that supplied by a 15-horsepower tractor on a 3-bottom 14-inch moldboard plow did not result in covering a greater number of acres per 10-hour day. However, the use of a 20-horsepower tractor instead of a 15-horsepower tractor with a 4-bottom 14-inch moldboard plow resulted in an increase of about 19 percent in acres plowed per 10-hour day. Vertical-disk plows were all drawn with tractors and covered about 3 acres of ground per day per foot of width. With a 10-foot vertical-disk plow drawn with a 15-horsepower tractor approximately 17 percent more acres were covered in a 10-hour day than with a 7-foot vertical disk plow drawn with the same power.

Plowing in the Pacific Northwest was almost entirely with the moldboard plow. The amount of power used on a given size of implement was somewhat larger and the number of acres covered per 10-hour day was somewhat smaller than in the Northern Great Plains. The use of an 8-horse team instead of a 6-horse team on a 2-bottom 14-inch moldboard plow did not result in a greater accomplishment per 10-hour day. Moldboard plows of 4-bottoms and larger were almost entirely drawn by tractors. The 25-horsepower crawler-type tractor was the most common source of power for 4-bottom and larger moldboard plows. An increase in size of plow for this power resulted in an increase in acreage covered per 10-hour day.

Single-disk harrows in the Northern Great Plains were drawn almost entirely with horses, whereas tandem-disk harrows were largely drawn with tractors. Somewhat more power was used on tandem-disk harrows of a given size than on single-disk harrows but the acreage covered per 10-hour day was practically the same for each type of disk harrow resulting in quite a material saving of time by the use of the tandem disk when it is necessary to disk the land more than once. Disking in the Pacific Northwest was almost entirely with the tandem-disk harrow drawn with horses. The rates of accomplishment were quite comparable with those in the Northern Great Plains.

Spike-tooth harrows used in the Northern Great Plains were mainly those of from 15 to 28 feet in width drawn with from 4 to 6 horses, the most common size of outfit being the 20-foot harrow drawn with 4 horses. For spike-tooth harrows of that size the use of a 6-horse team instead of 4 horses resulted in an increased accomplishment of only 5 percent. For spike-tooth harrows larger than 20 feet, an increase in number of horses resulted in an appreciable increase in acres covered per 10-hour day. Tractors of 10 and 15 horsepower were most commonly used as the motive power for tractor-drawn spike-tooth harrows. The use of the larger tractor on a given size of implement did not result in greater accomplishment per day. The usual rate of accomplishment of spike-tooth harrows drawn with horses was approximately 2 acres per day per foot of width whereas that of spike-tooth harrows drawn with tractors was approximately 3 acres per day per foot of width. Horse-drawn spike-tooth harrows in the Pacific Northwest were mainly those of from 10 to 32 feet in width and were drawn with from 4- to 8-horse teams. The most common size of implement was the 20-foot harrow drawn with either 6 or 8 horses. The usual rate of accomplishment for horse-drawn spike-tooth harrows was approximately 2 acres per day per foot of width while that of tractor-drawn spike-tooth harrows was approximately 2.5 acres per day per foot of width. Spring-tooth harrows were of minor importance in both the Northern Great Plains and in the Pacific Northwest.

Duckfoot cultivators used in the Northern Great Plains were mainly those of from 7 to 12 feet in width, those of over 8 feet in width being mainly drawn with tractors. Horse-drawn duckfoot cultivators covered approximately 2 acres per day for each foot of width whereas tractor-propelled implements covered about 3 acres per day for each foot of width.

Weeding with rod or blade weeders in the Pacific Northwest was mainly with horses. The rod weeders in most general use were from 10 to 36 feet in width while blade weeders in general use were from 12 to 36 feet in width. The most common size of horse-drawn rod and blade weeder was one of 12-foot width drawn with either 6 or 8 horses. The use of an 8-horse team instead of 6 horses did not result in a greater accomplishment per 10-hour day.

Listing in the Northern Great Plains was mostly with a 2-row implement drawn with tractors. The 2-row lister drawn with a 15-horsepower tractor accomplished 54 percent more work in a 10-hour day than when drawn with 6 horses. In a few areas of the Northern Great Plains it is a common practice to use small packers behind moldboard plows. Packers not used in connection with moldboard plows were mainly those of from 9 to 16 feet in width. They were drawn almost entirely with 4 horses. An increase in width of packers resulted in an increased accomplishment per day but not always in proportion.

Planting potatoes in the Northern Great Plains was mainly with a 1-row planter drawn with 2 horses. The use of 4 instead of 2 horses to draw the 1-row planter resulted in 14 percent more acres being covered per 10-hour day.

Planting corn in the Northern Great Plains was with 1-, 2-, and 4-row planters but by far the greatest amount of this work was with a 2-row planter drawn with 2 horses. Two-row planters drawn with 2 horses accomplished 55 percent more work per day than a 1-row planter drawn with the same power. A 4-row planter propelled with tractor power covered about 195 percent more acres per day than the 2-row machine drawn with 2 horses.

Grain drills in use in the Northern Great Plains were mainly those of from 8 to 20 feet in width, the majority being 10-foot disk drills drawn with 4 horses. A change in power from 4 horses to a 10-horsepower tractor to draw the 10-foot drill resulted in a 55 percent increase in acres covered per day. An increase in tractor power over the 10-horsepower tractor in connection with a 10-foot drill did not result in an appreciable increase in accomplishment per day. Horses were not used with drills of more than 12 feet width. The use of a 20-foot instead of a 12-foot drill drawn with a 15-horsepower tractor resulted in an increase in accomplishment per day of about 40 percent. Grain drills in the Pacific Northwest were of the disk, hoe, and shoe type, the majority being disk drills drawn with horses. The use of a 10-foot drill drawn with 4 horses instead of a 6-foot drill drawn with the same power resulted in an increase in accomplishment of approximately 57 percent. Cultivating corn in the Northern Great Plains was with 1-, 2-, and 3-row cultivators. Two-row cultivators drawn with 4 horses covered approximately twice as much acreage per 10-hour day than did 1-row cultivators drawn with 2 horses.

Mechanical harvesting of corn was almost entirely with the 1-row binder drawn with horses. Binders of this size drawn with 4 horses did not accomplish more work per day than when a 2-horse team supplied the power.

Grain harvesting in the Northern Great Plains was with binders, headers, and combines. Harvesting with the binder was the most common method. Combines ranked second in importance with only a limited acreage harvested with the header. Eight-foot binders and twelve-foot headers and combines were the ones in most common use. The 8-foot binder drawn with a 15-horsepower tractor accomplished about 40 percent more work in a given time than a binder of the same size drawn with 4 horses. Likewise, a 16-foot combine drawn with a 15-horsepower tractor accomplished about 58 percent more work in a given time than a 10-foot combine drawn with the same power. Grain harvesting in the Pacific Northwest was with binders, headers, and combines, but the combine was by far the most common harvesting method. Horses were utilized to draw these machines to a much larger extent than in the Northern Great Plains and because of a more rugged topography in the Pacific Northwest the accomplishment per 10-hour day for implements of comparable size and drawn by the same power was considerably less than in the Northern Great Plains.

Harvesting of hay in both the Northern Great Plains and in the Pacific Northwest was largely with 5-foot mowers and 10-foot sulky rakes drawn with 2 horses. The rate of accomplishment in the Northern Great Plains was approximately 2 acres per 10-hour day for each foot of width while in the Pacific Northwest the accomplishment was slightly less.

Table 37. - Rates of doing field work with implements of different kinds and sizes when drawn with horses and with tractors, Northern Great Plains

Operation	Kind and size of implement 1/	Reports	Power used 2/	Acreage covered per 10-hour day
		Number		Acres
Plowing	2-bottom 14-inch moldboard plow	64	4 horses	5.0
	do	219	5 horses	5.3
	do	143	6 horses	5.3
	2-bottom 12-inch moldboard plow	12	10-hp tractor	7.1
	2-bottom 14-inch moldboard plow	90	do	8.0
	2-bottom 16-inch moldboard plow	17	do	9.5
	3-bottom 14-inch moldboard plow	45	8 horses	8.4
	do	42	10-hp tractor	11.1
	do	10	12-hp tractor	11.0
	do	237	15-hp tractor	12.4
	do	21	17-hp tractor	11.6
	do	30	18-hp tractor	13.8
	do	13	20-hp tractor	12.3
	3-bottom 16-inch moldboard plow	19	15-hp tractor	14.0
	4-bottom 14-inch moldboard plow	48	15-hp tractor	14.3
	do	7	17-hp tractor	14.6
	do	27	18-hp tractor	17.3
	do	19	20-hp tractor	17.0
	40-inch disk plow	15	15-hp tractor	10.4
	50-inch disk plow	10	do	12.6
	7-foot vertical disk plow	43	do	23.8
	9-foot vertical disk plow	38	do	26.9
	10-foot vertical disk plow	17	do	27.8
	do	13	18-hp tractor	31.6
Disking	8-foot single-disk harrow	164	4 horses	16.6
	do	26	5 horses	17.3
	9-foot single-disk harrow	21	4 horses	19.1
	10-foot single-disk harrow	28	do	19.4
	do	21	5 horses	20.1
	do	38	6 horses	20.8
	do	24	10-hp tractor	33.5
	14-foot single-disk harrow	8	10-hp tractor	46.3
	20-foot single-disk harrow	8	15-hp tractor	67.1
	8-foot tandem-disk harrow	22	6 horses	17.1
	do	14	8 horses	17.5
	do	44	15-hp tractor	27.5
	do	43	10-hp tractor	25.7
	10-foot tandem-disk harrow	27	do	32.1
	do	133	15-hp tractor	31.3
	do	20	18-hp tractor	32.2
	do	14	20-hp tractor	30.7

Table 37. - Rates of doing field work with implements of different kinds and sizes when drawn with horses and with tractors, Northern Great Plains - Continued

Operation	Kind and size of implement 1/	Reports	Power used 2/	Acreage covered per 10-hour day
		Number		Acres
Harrowing	15-foot spike-tooth harrow	71	4 horses	30.1
	16-foot spike-tooth harrow	36	do	32.8
	18-foot spike-tooth harrow	12	do	34.6
	20-foot spike-tooth harrow	176	do	39.8
	do	22	5 horses	43.5
	do	45	6 horses	41.6
	do	31	10-hp tractor	69.7
	22-foot spike-tooth harrow	21	4 horses	45.0
	do	12	5 horses	46.3
	do	5	6 horses	55.8
	do	3	10-hp tractor	73.7
	24-foot spike-tooth harrow	77	4 horses	44.5
	do	23	5 horses	48.1
	do	36	6 horses	50.8
	do	15	10-hp tractor	79.9
	25-foot spike-tooth harrow	7	4 horses	40.4
	do	6	5 horses	53.7
	do	17	6 horses	55.8
	do	14	10-hp tractor	87.1
	do	7	15-hp tractor	64.3
	26-foot spike-tooth harrow	67	4 horses	47.2
	do	38	5 horses	48.5
	do	38	6 horses	55.7
	do	5	10-hp tractor	76.0
	do	5	15-hp tractor	74.6
	28-foot spike-tooth harrow	8	4 horses	41.9
	do	3	15-hp tractor	111.0
	30-foot spike-tooth harrow	22	15-hp tractor	83.5
	32-foot spike-tooth harrow	8	do	107.8
	9-foot spring-tooth harrow	4	4 horses	18.8
	do	2	6 horses	20.0
	10-foot spring-tooth harrow	3	4 horses	15.7
	do	5	15-hp tractor	29.2
	12-foot spring-tooth harrow	3	4 horses	22.3
	do	5	6 horses	23.6
	do	12	15-hp tractor	36.0
Cultivating	7-foot duckfoot cultivator	7	6 horses	14.1
	8-foot duckfoot cultivator	10	4 horses	16.3
	do	7	6 horses	15.1
	9-foot duckfoot cultivator	20	do	15.6
	do	36	15-hp tractor	27.8
	10-foot duckfoot cultivator	9	6 horses	18.0
	do	34	15-hp tractor	29.6
	do	6	18-hp tractor	35.7
	do	5	20-hp tractor	32.4

Table 37. - Rates of doing field work with implements of different kinds and sizes when drawn with horses and with tractors, Northern Great Plains - Continued

Operation	Kind and size of implement 1/	Reports	Power used 2/	Acreage covered per 10-hour day
		Number		Acres
Cultivating Cont.	11-foot duckfoot cultivator	8	15-hp tractor	35.0
	12-foot duckfoot cultivator	34	15-hp tractor	34.0
	do	7	18-hp tractor	34.6
	do	5	20-hp tractor	41.4
Listing	1-row lister	40	4 horses	8.0
	2-row lister	19	6 horses	14.8
	do	43	10-hp tractor	20.8
	do	35	15-hp tractor	22.9
Packing	9-foot packer	3	4 horses	20.7
	10-foot packer	14	do	22.9
	11-foot packer	2	do	20.0
	12-foot packer	16	do	20.2
	15-foot packer	2	do	41.5
	16-foot packer	9	do	42.4
Planting potatoes	1-row planter	37	2 horses	5.7
	do	22	4 horses	6.5
Planting corn	1-row planter	15	2 horses	8.9
	2-row planter	589	do	13.8
	4-row planter	21	10-hp tractor	40.7
Drilling grain	8-foot disk drill	61	4 horses	17.1
	9-foot disk drill	34	do	18.7
	10-foot disk drill	430	do	20.3
	do	34	10-hp tractor	31.5
	do	75	15-hp tractor	30.9
	do	13	18-hp tractor	34.2
	do	13	20-hp tractor	33.3
	11-foot disk drill	149	4 horses	22.5
	do	35	10-hp tractor	36.4
	do	10	15-hp tractor	37.3
	12-foot disk drill	18	4 horses	20.3
	do	24	do	24.6
	do	40	15-hp tractor	37.6
	14-foot disk drill	39	do	43.8
	18-foot disk drill	4	do	28.8
	20-foot disk drill	12	do	52.5
	10-foot press drill	12	4 horses	20.0
	do	9	6 horses	22.2
Cultivating corn	1-row shovel cultivator	547	2 horses	7.7
	2-row shovel cultivator	15	do	10.5
	do	37	3 horses	14.4
	do	296	4 horses	15.3
	do	43	10-hp tractor	26.5
	2-row lister cultivator	66	4 horses	17.7
	3-row lister cultivator	15	15-hp tractor	37.2

Table 37. - Rates of doing field work with implements of different kinds and sizes when drawn with horses and with tractors, Northern Great Plains - Continued

Operation	Kind and size of implement 1/	Reports	Power used 2/	Acreage covered per 10-hour day
		Number		Acres
Harvesting corn	1-row binder	25	2 horses	8.7
	do	302	3 horses	7.2
	do	72	4 horses	7.9
	do	12	10-hp tractor	10.1
	1-row corn picker	6	6 horses	7.7
	do	12	10-hp tractor	10.7
Harvesting grain	6-foot binder	18	4 horses	12.9
	7-foot binder	143	do	15.3
	8-foot binder	633	do	17.0
	do	50	10-hp tractor	24.3
	do	35	15-hp tractor	23.8
	10-foot binder	37	10-hp tractor	28.6
	do	55	15-hp tractor	29.7
	12-foot header	84	4 horses	22.2
	do	62	6 horses	26.5
	do	13	10-hp tractor	28.9
	10-foot combine	21	15-hp tractor	24.0
	12-foot combine	142	do	28.9
	do	18	18-hp tractor	28.5
	14-foot combine	10	15-hp tractor	31.5
	15-foot combine	23	do	34.4
	16-foot combine	49	do	38.0
	do	13	20-hp tractor	38.3
Mowing hay	5-foot mower	731	2 horses	9.7
	6-foot mower	141	do	12.1
Raking hay	10-foot sulky rake	654	do	20.1
	12-foot sulky rake	101	do	23.9

1/ The size of implement is the working width and in some cases represents 2 or more implements in a combination hitch.

2/ In all cases where tractors are indicated as the source of power those of the high-wheel type were used.

Table 38. - Rates of doing field work with implements of different kinds and sizes when drawn with horses and with tractors, Pacific Northwest

Operation	Kind and size of implement 1/	Report	Power used	Acreage covered per 10-hour day
		Number		Acres
Plowing	2-bottom 14-inch moldboard plow	46	6 horses	5.2
	do	32	8 horses	5.1
	2-bottom 16-inch moldboard plow	42	do	6.4
	3-bottom 14-inch moldboard plow	42	do	7.2
	do	48	9 horses	8.3
	do	41	10 horses	8.4
	do	13	12 horses	8.8
	do	12	15-hp high wheel tractor	12.1
	3-bottom 16-inch moldboard plow	34	12 horses	9.0
	do	5	15-hp high wheel tractor	12.8
	4-bottom 14-inch moldboard plow	16	25-hp track type tractor	14.9
	4-bottom 16-inch moldboard plow	17	do	16.9
	5-bottom 14-inch moldboard plow	9	do	17.6
	6-bottom 14-inch moldboard plow	9	do	21.2
	8-bottom 16-inch moldboard plow	9	50-hp track type tractor	30.3
Disking	7-foot tandem-disk harrow	3	6 horses	12.7
	do	5	8 horses	16.0
	8-foot tandem-disk harrow	8	6 horses	13.6
	do	28	8 horses	17.7
	10-foot tandem-disk harrow	8	25-hp track type tractor	30.8
Harrowing	10-foot spike-tooth harrow	5	4 horses	26.2
	12-foot spike-tooth harrow	4	do	31.2
	15-foot spike-tooth harrow	16	do	25.9
	do	7	6 horses	31.0
	16-foot spike-tooth harrow	10	4 horses	28.0
	do	9	6 horses	29.3
	18-foot spike-tooth harrow	10	do	34.8
	20-foot spike-tooth harrow	41	do	37.6
	do	37	8 horses	40.4
	21-foot spike-tooth harrow	4	do	35.8
	22-foot spike-tooth harrow	7	6 horses	44.4
	24-foot spike-tooth harrow	9	do	46.9
	do	55	8 horses	42.6
	25-foot spike-tooth harrow	9	6 horses	50.3
	do	19	8 horses	43.6
	26-foot spike-tooth harrow	3	6 horses	43.0
	30-foot spike-tooth harrow	12	7 horses	60.8
	do	20	8 horses	56.3
	32-foot spike-tooth harrow	40	do	50.0
	36-foot spike-tooth harrow	3	25-hp track type tractor	79.0
	40-foot spike-tooth harrow	16	do	104.1
	48-foot spike-tooth harrow	5	do	114.2
	60-foot spike-tooth harrow	4	50-hp track type tractor	185.5

Table 38. - Rates of doing field work with implements of different kinds and sizes when drawn with horses and with tractors, Pacific Northwest - Continued

Operation	Kind and size of implement 1/	Report	Power used	Acreage covered per 10-hour day
		Number		Acres
Harrowing	5-foot spring-tooth harrow	2	4 horses	11.5
	6-foot spring-tooth harrow	5	do	11.0
	8-foot spring-tooth harrow	2	do	15.5
	6-foot spring-tooth harrow	3	6 horses	11.0
	8-foot spring-tooth harrow	2	do	16.0
	9-foot spring-tooth harrow	2	8 horses	14.0
	12-foot spring-tooth harrow	8	do	19.9
Weeding	10-foot rod weeder	12	6 horses	21.7
	do	13	8 horses	17.8
	12-foot rod weeder	108	6 horses	23.9
	do	18	7 horses	23.4
	do	116	8 horses	23.4
	do	5	20-hp track-type tractor	25.0
	do	3	25-hp track-type tractor	60.0
	20-foot rod weeder	4	do	55.8
	24-foot rod weeder	18	do	70.2
	36-foot rod weeder	10	do	88.0
	12-foot blade weeder	9	6 horses	24.7
	do	4	6 horses	24.2
	16-foot blade weeder	4	6 horses	32.5
	do	8	8 horses	26.4
	36-foot blade weeder	4	25-hp track-type tractor	83.8
Drilling grain	6-foot disk drill	2	4 horses	13.0
	7-foot disk drill	7	do	14.4
	8-foot disk drill	30	do	17.4
	9-foot disk drill	23	do	20.3
	do	17	6 horses	18.1
	10-foot disk drill	19	4 horses	20.4
	do	82	6 horses	22.0
	11-foot disk drill	30	do	23.7
	12-foot disk drill	27	do	28.4
	20-foot disk drill	11	25-hp track-type tractor	56.5
	9-foot hoe drill	7	4 horses	18.7
	do	27	6 horses	17.2
	10-foot hoe drill	5	4 horses	20.2
	do	62	6 horses	20.7
	9-foot shoe drill	11	4 horses	20.0
	do	16	6 horses	20.1
	10-foot shoe drill	4	do	24.2
Harvesting grain	6-foot binder	13	3 horses	7.5
	do	37	4 horses	8.1
	do	14	5 horses	8.6
	7-foot binder	45	4 horses	9.2

Table 38. - Rates of doing field work with implements of different kinds and sizes when drawn with horses and with tractors, Pacific Northwest - Continued

Operation	Kind and size of implement 1/	Report	Power used	Acreage covered per 10-hour day
		Number		Acres
Harvesting grain	8-foot binder	55	4 horses	11.8
	12-foot header	13	6 horses	19.8
	14-foot header	29	do	22.1
	10-foot combine	19	8 horses	17.0
	12-foot combine	24	do	19.5
	do	15	12 horses	21.5
	14-foot combine	8	16 horses	25.0
	do	11	25-hp track-type tractor	25.6
	15-foot combine	7	25-hp track-type tractor	25.4
	16-foot combine	14	16 horses	29.4
	do	30	25-hp track-type tractor	35.8
	18-foot combine	5	50-hp track-type tractor	40.5
	20-foot combine	5	50-hp track-type tractor	40.5
Mowing hay	4-foot mower	12	2 horses	9.0
	5-foot mower	170	do	8.9
	6-foot mower	12	do	10.0
Raking hay	10-foot sulky rake	163	do	19.3
	12-foot sulky rake	7	do	21.3

1/ The size of implement is the working width and in some cases represents 2 or more implements in a combination hitch.

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